DOCUMENT RESUME

ED 308 833 IR 013 893

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TITLE The Effects of Computer Animated Lesson Presentations and Cognitive Practice Activities on Young Children's Learning in Physical Science.
PUB DATE Feb 89
NOTE 17p.; In: Proceedings of Selected Research Papers presented at the Annual Meeting of the Association for Educational Communications and Technology (Dallas, TX, February 1-5, 1989). For the complete proceedings, see IR 013 865. For related papers, see IR 013 892-894.
PUB TYPE Reports - Research/Technical (143) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Analysis of Variance; *Animation; *Cognitive Style; *Computer Assisted Instruction; Computer Graphics; Computer Simulation; Elementary Education; Elementary School Science; Grade 4; Grade 5; *Instructional Design; *Intermode Differences; Multiple Choice Tests
IDENTIFIERS Learner Control

ABSTRACT

The purpose of this study was to examine the effects of animated instruction and levels of practice on application learning in a computer-based instructional (CBI) science lesson. A total of 119 fourth and fifth grade students participated in an introductory lesson covering Newton's Laws of Motion. Three levels of visual elaboration (static graphic, animated graphic, no graphic) were crossed with three levels of practice (behavioral, cognitive, no practice). Behavioral practice consisted of traditional questioning after each of four lesson parts. Cognitive practice consisted of a structured simulation where students were given increasing control over an animated "starship." Main effects were found for both visual elaboration and practice. An interaction was also found between visual elaboration and practice. Other data, such as response latency, attitudes, student perceptions, and incidental learning, were also collected. Two tables display data analyses and four figures include sample screen displays. (38 references) (Author/CGD)

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The Effects of Computer Animated Lesson Presentations and Cognitive Practice Activities on Young Children's Learning in Physical Science

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Abstract

The purpose of this study was to examine the effects of animated instruction and levels of practice on application learning in a computer-based instructional (CBI) science lesson. A total of 119 fourth and fifth grade students participated in an introductory lesson covering Newton's Laws of Motion. Three levels of Visual Elaboration (Static Graphic, Animated Graphic, No Graphic) were crossed with three levels of Practice (Behavioral, Cognitive, No Practice). Behavioral Practice consisted of traditional questioning after each of four lesson parts. Cognitive Practice consisted of a structured simulation where students were given increasing control over an animated "starship". Main effects was found for both Visual Elaboration and Practice. An interaction was also found between Visual Elaboration and Practice. Other data, such as response latency, attitudes, student perceptions, and incidental learning, was also collected.

Introduction

One of the goals of instructional design is to match the needs of instruction with the capabilities of the delivery system (Gagne', Briggs, & Wager, 1987). This implies that lesson design should be derived from learner and instructional variables, rather than machine variables. However, given the fact that new technologies provide new instructional design opportunities, instructional designers must consider which instructional attributes of a given delivery system actually delivery the most appropriate external lesson events in order to activate the internal learning processes which meet the lesson goals and objectives.

Many pitfalls plague the introduction of a new technology to education (Salomon & Gardner, 1986). A common tendency when designing instruction with a new technology is to mimmick the "status quo" in an older or traditional technology (Siegel & Davis, 1986; Streibel, 1986). In contrast, new technologies have historically been prone to the misconception that they are innately superior to traditional approaches. This latter pitfall has experienced a cycle of reoccurence during the past 30 years with such "new" technologies as programmed instruction, instructional television, computer-based instruction (CBI), computer programming (e.g. LOGO), and more recently interactive video (Salomon & Gardner, 1986). Clark (1983, 1985) has warned and cautioned against encouraging this misconception quite convincingly.

While it is generally agreed that CBI is just another instructional medium which acts as the delivery "truck" for instruction (p. 445, Clark, 1983), it is contended that the potentials of CBI have not as yet been fully realized (Hannafin & Rieber, 1986; Streibel, 1986). Salomon and Gardner (1986) have stated that "researchers have learned that only specific, relatively unique features of a medium make a difference" (p. 14). Many features of CBI appear to offer instructional opportunities which might be able to make a difference — features which are difficult or impossible to incorporate with most other media. Animation is one such feature.

There is a strong and rich historical perspective that humans are particularly adept visual learners. The research of Paivio (1979, 1983) and others (Intraub, 1979; Kobayashi, 1986; Kosslyn, Holyoak, & Huffman, 1976; Madigan, 1983) have expressed an apparent processing "partnership" between verbal and visual learning. According to this dual-coding theory, words and pictures activate independent visual and verbal codes. When the information to be learned is highly imageable, a learner is able to encode the information into long term memory (LTM) using both a verbal and visual trace. This redundant encoding increases the probability of retrieval since if one memory trace is lost (whether visual or verbal) the other is still available.

The dual-coding perspective presents a theoretical underpinning to support the use of visuals, whether static or animated, in instruction. Recent reviews support the use of instructional visuals

(Dwyer, 1978; Kobayashi, 1986; Levie & Lentz, 1982; Levin & Lesgold, 1978). However, it is uncertain whether animated visuals offer anything unique to instruction. Typically, CBI has used animation to create interesting (and potentially distracting) lesson reinforcers. A need exists to determine what features of animation have the potential to support instruction more directly. Interestingly, results from most animation studies have not supported the contention that animated visuals offer more instructionally than static visuals (Caraballo, 1985; King, 1975; Moore, Nawrocki, & Simutis, 1979; Rieber & Hannafin, 1988; Rieber, in press).

Perceptually, animation offers two attributes beyond that of static visuals: motion and trajectory (Klein, 1987). Therefore, animated visuals should be most effective when the attributes of motion and trajectory are congruent to the demands of the instructional task. Instruction in physics presents many examples of this. Research has shown that many students have deep-seated misconceptions about physical laws (diSessa, 1982) and traditional instruction often serves to conflict and contradict these "personal theories" (Champagne, Klopfer, & Gunstone, 1982). Designing instruction to include verbal descriptions as well as animated descriptions of "motion" concepts should improve learning. If the concepts to be learned include motion and trajectory, then the proper use of animation is believed to have the potential to increase learning through a visual elaboration process. Congruency between presentation and task variables is one groundrule cited in the review by Levin and Lesgold (1978) for the efficacy of pictures in reading. Differentiated effects between animated and static visuals is contended to be an extension of this groundrule.

Practice is another instructional variable which has been studied extensively during the past two decades (Hamaker, 1986) and which has recently been studied in CBI. CBI studies have shown that practice can be a very powerful influence on student achievement (Hannafin, Phillips, Rieber, & Garhart, 1987; Hannafin, Phillips, & Tripp, 1986). Traditional practice is operationally defined as asking enroute questions during instruction and is based largely on the pioneering work of Rothkopf (1966) and others. The use of practice in this sense follows a more behavioral approach which calls for frequent rehearsal of relevant lesson information with appropriate feedback and reinforcement (Wager & Wager, 1985). Behavioral practice activities are believed to most effective for lower-level or fact learning. However, CBI again affords many different approaches to practice which provide a more imaginative and innovative use of the medium (Salisbury, 1988; Salisbury, Richards, & Klein, 1985). A more cognitive approach to the design of practice activities would more actively involve the student in the instructional process. Practice of this sort would encourage mental conflicts to arise which could be resolved by the student through strategies such as informal hypothesis testing. Therefore, practice activities which encourage varied and deeper levels of cognitive processing would rely on situations of "critical confusion" (Norman, 1978) or disequilibrium (in the Piagetian sense). Cognitive practice activities, though less reliable and efficient for lower-level learning, would be of greatest value for higher-level learning.

The purpose of this study was to study the effects of animated instruction and practice on application learning in a CBI science lesson with concepts related to motion and trajectory. There were several hypotheses in this study: 1) animated instruction would be more effective in presenting the lesson content than instruction containing static visuals or no visuals; 2) Cognitive Practice activities, which encourage process over content, would better facilitate higher-level learning than Behavioral Practice activities; and 3) practice of any type would be of greatest value where the lesson elaboration support was minimal.

Methods

Subjects

The subjects consisted of 119 fourth and fifth graders from a rural public elementary school in central Texas. Participation was voluntary and selection based on parent consent. A total of 55 fourth and 64 fifth graders participated with an average age of 10.41 years (SD=.83).

CBI Lesson Content

The CBI lesson, first developed for previous studies (Rieber & Hannafin, 1988; Rieber, in press), described and explained Isaac Newton's Laws of Motion. The lesson was divided into four

parts. The first lesson part introduced the learner to Isaac Newton's formal discovery of certain physical laws as well as several basic principles such as Newton's first law. The second part introduced the concept that equal but opposite forces are needed to cause objects to stop. This section dealt only with one-dimensional space. The third part expanded this notion to include the effects of unequal forces acting upon a stationary object. The third part also presented these concepts in one-dimensional space. Finally, the fourth part added the notion of two-dimensional space to the above concepts. All instruction was presented at an introductory level. Approximately 60 minutes was required to complete the lesson.

Lesson Versions

Three levels of Visual Elaboration (Static Graphic, Animated Graphic, No Graphic) were crossed with three levels of Practice (Behavioral, Cognitive, None). The respective practice activity was provided immediately after each of the four lesson parts.

Behavioral Practice. Behavioral Practice consisted of 5 multiple-choice questions presented after each of the four lesson parts. The questions covered the relevant material in that lesson part. Feedback was provided to the students in the form of knowledge of correct results. This practice type is termed behavioral due to the largely reinforcing nature of the practice activity.

Cognitive Practice. Cognitive Practice consisted of an activity which involved the student in a structured simulation involving the science concepts. Students were given increasing levels of control over a simulated, free-floating object. The free-floating object was called a "starship" and was represented by a triangular symbol on the computer screen. For example, students practiced increasing and decreasing the speed of the starship after lesson part 3 and practiced how forces acting on an object in 90 degree increments affect the final trajectory of the object in two dimensional space after lesson part 4. This practice activity is an application of the "dynaturtle microworld" developed by diSessa (1982) and others (White, 1984). An example of Cognitive Practice is depicted in Figure 1.

Insert Figure 1 About Here

No Practice. This level acted as a control. No practice activity was given to the student. Students in this condition progressed sequentially through the lesson parts.

Each of the three levels of Practice was crossed with three levels of Visual Elaboration (Static Graphic, Animated Graphic, No Graphic). Visual elaborations were added to those lesson parts judged as the most difficult and most needing additional instruction as determined from previous research (Rieber & Hannafin, in press; Rieber, in press).

Static Graphic. The textual presentation of the science instruction was supplemented by embedding static graphics throughout the lesson. These graphics provided static illustrations of the science content. Forces were represented graphically by a foot giving an object a kick, such as ball. Motion and trajectory attributes were represented by arrows and path lines. An example of a computer screen containing a static graphic elaboration is illustrated in Figure 2.

Insert Figure 2 About Here

Animated Graphic. The supplemental instruction was in the form of supportive, animated graphics. This condition also used the foot and ball symbols to represent an object being acted upon by forces. However, the ball was then animated to demonstrate the consequences of the forces on its movement. For example, a stationary ball was shown being kicked two times to the right. The ball was animated across the screen to the right and then stopped by two kicks to the left. This demonstrated the principle that an equal force in the opposite direction is needed to stop the object. An example of this is illustrated in Figure 3.

Insert Figure 3 About Here

No Graphic. This level also acted as a control. No visual support was added to the lesson in this condition. The textual material for this condition was identical to that provided in the other two conditions.

Dependent Measures

Lesson Posttest. The posttest consisted of 26 questions measuring application learning corresponding roughly to rule-learning as defined by Gagne (1985). Multiple-choice questions (1 answer and 4 distractors) were used as the testing format. The posttest measured student performance on the following six lesson objectives:

1) apply the rule that, without any outside forces, an object in motion will remain in motion and an object at rest will remain at rest (Newton's First Law);
2) apply the rule that, in one-dimensional space, when an object at rest is put into motion by a force, an equal force applied in the opposite direction is needed to stop the object;
3) apply the rule that, in one-dimensional space, when an object at rest is acted on by unequal forces, the final speed of the object is the result of the sum of the forces acting on the object from both sides;
4) apply the rule that, in one-dimensional space, when an object at rest is acted on by unequal forces, the final trajectory of the object is the result of the sum of the forces acting on the object from both sides;
5) apply the rule that, in two-dimensional space, forces occurring at right angles to each other act independently on the object (orthogonality); and
6) apply Newton's second law, summarized by the equation force=mass times acceleration (F=ma).

Objectives 1 to 5 are listed hierarchically such that each objective (starting with 1) is generally considered prerequisite to the next. Mastery of later objectives is believed to be dependent upon mastery of the earlier objectives. Objective 6 was not intentionally taught in the lesson material, but was implied only in the animated graphics condition. This objective was included to try to measure the incidental learning effect of animation. Thus, the six objectives are listed in order of difficulty (easiest to hardest). The format of the posttest questions was approximately half all-verbal and half verbal/visual. About half of the verbal/visual questions involved animation. No feedback was provided after each question. Students were not given their performance scores at the end of the posttest, instead all were informed that they had "passed". KR-20 reliability of the posttest was .87.

Response Latency. The time required by students to answer each posttest question was measured to the nearest second. Processing time was measured as the time required by students to answer each of the posttest questions once prompted to do so. The prompt was the final text

displayed on the screen for each question.

Attitudes. Students' general attitudes about computers, science, and the lesson, were surveyed at the end of the lesson after they had been informed by the computer that they had "passed". Additionally, students were asked for their perception of lesson difficulty. All of these survey questions were presented using a five point Likert-type scale with "1" being the most positive, "5" the most negative, and "3" being neutral.

Procedures

All instruction and testing was administered by computer. As students arrived to the computer lab, they were randomly assigned to one of the treatment groups. Before beginning the lesson, all students were given a group orientation to the lesson. The orientation provided basic information about the location of computer keys and other protocols in order to minimize confusion and distraction during the lesson. Once instructed to begin, students completed the computer lesson individually. The posttest was automatically administered to each student upon completion of the four lesson parts. Immediately after completing the posttest all students were informed that they had passed the lesson, upon which the attitude survey was administered. Approximately one hour was needed to complete the lesson.

Design and Data Analysis

A 3 X 3 X (6) factorial design was used to study the effects of the instructional variables on students' application learning. Two between-subjects factors (Visual Elaboration, Practice) were crossed with one within-subjects factor (Learning Objective). The between-subjects factors consisted of three levels of Visual Elaboration (Static Graphic, Animated Graphic, No Graphic) and three levels of Practice (Behavioral, Cognitive, No Practice). The within-subjects factor consisted of the six learning objectives which also served as a dependent measure. Statistical procedures included mixed-effects analysis of variance (ANOVA) and Tukey's studentized range test for follow-up multiple-comparisons on means.

In addition, two separate analyses were conducted on the response latency and attitudinal variables.

Results and Discussion

Posttest

Percent means and standard deviations of student posttest scores are contained in Table 1. The ANOVA summary table is contained in Table 2. A significant main effect was found for Visual Elaboration, $F(2,660)=6.09$, $p=.002$. Students in the Animated Graphics group scored significantly higher on the posttest than those in the No Graphics or Static Graphics groups. No significant difference was detected between the Static Graphics and No Graphics groups.

Insert Table 1 About Here

Insert Table 2 About Here

A significant main effect was found for Practice, $F(2,660)=5.83$, $p=.003$. Students in the Cognitive Practice group scored higher on the posttest than those in the No Practice group. Although the Cognitive Practice group mean (57.3%) was larger than the Behavioral Practice group mean (50.9%), this effect size was not large enough to be significant. No significant difference was found between the Behavioral Practice and No Practice groups.

A significant main effect was found for Learning Objective, $F(5,660)=21.86$, $p=.0001$. As expected, learning was not uniform across all of the lesson objectives. Three distinct difficulty ranges emerged. Overall, students performed best on the group of test items measuring objectives 1, 2, 3, and 4 (mean=59.6%). Next in difficulty were the questions measuring objective 5 (mean=44.8%). Finally, students found test items for objective 6 the most difficult (mean=28.6%). These results partially support the earlier contention that the objectives were hierarchically organized. Not surprisingly, students had more difficulty on objective 7 (just above the level expected from guessing) since this objective was not taught directly in any of the treatments, and only incidentally in the Animated Graphic treatment. Follow-up analyses indicated a marginal effect for Visual Elaboration on this objective. Students in the Animated Graphic treatment outperformed the Static Visual and No Visual groups at $p=.09$.

A significant interaction was detected between Visual Elaboration and Practice, $F(4,660)=4.28$, $p=.002$. The nature of this interaction is shown in Figure 4. Students who received Behavioral Practice performed best on the posttest when also given instruction presented with Animated Graphics than with Static Graphics or No Graphics. Students receiving Cognitive Practice did not vary significantly on the posttest based on which type of visual elaboration was used.

Insert Figure 4 About Here

Response Latency

A main effect was found for Practice, $F(2,660)=10.92$, $p=.0001$. Students who received practice (Behavioral or Cognitive), took significantly less time to answer the posttest questions than students who did not receive practice.

A main effect was found for Learning Objective, $F(5,660)=35.19$, $p=.0001$. In general, students took longer to respond to difficult questions than easy questions. There was one exception to this pattern: students needed as much time to answer questions covering objective 1 (the easiest objective) as they did for objectives 5 and 6 (the most difficult questions). This exception was not predicted and is not readily interpretable.

Attitudes

No effects on attitude were found for either Visual Elaboration (mean=1.46) or Practice (mean=1.46). Overall, students displayed favorable attitudes (between positive and very positive) regardless of which treatment they were given.

General Discussion

The purpose of this study was to study the effects of different levels of visual elaborations and different levels of practice on application learning in a CBI science lesson. This study was an extension of previous research investigating instruction using computer animation coupled with practice activities. The science material covering Newton's laws of motion was chosen for its conceptual density, the lack of student experience with the material, and its obvious congruency with animated instruction. Previous research using this material demonstrated that students found the

material very difficult, a factor which was believed to explain, at least partially, why no differences were found previously. Although the lesson material was extensively modified in the present study, students still found the content very difficult, as shown by the mean scores in Table 1. In this study, however, the nature of the visual elaboration and practice activity had an influence on student's application learning of the material.

Instruction containing animated elaborations of the lesson content had a definite influence on student performance as compared to static graphics or no graphics. All of the lesson objectives involved concepts and principles which were not only highly visual in nature, but also directly involved the attributes of motion and trajectory. It was hypothesized that students who were given precise representations, illustrations and examples of these concepts and principles would be in a better position to understand, retain, and retrieve the information and ideas than students who were not given adequate elaborations. This hypothesis was supported by the main effect on the Visual Elaboration factor.

Practice as an instructional activity has a long history of support. Previous research with this science material with this student population has indicated that practice has little effect when the lesson material is exceedingly difficult. In fact, under those conditions practice can be counterproductive. When practice requiring significant mental investment was required by the students already given the heavy cognitive strain of the lesson content, as in the Rieber and Hannafin (1988) study, students seemed to experience a kind of cognitive overload which lowered posttest performance. This is similar to the Yerkes-Dodson law where performance decreases as the amount of arousal surpasses an optimal level. Salomon (1983) has maintained that student perceptions of the amount of mental effort required by the instruction is a critical factor in learning. Students who incorrectly perceive material as easy fail to process the material effectively or thoroughly. Conversely, students who perceive material as too difficult are unwilling, or see themselves as unable, to learn. Interestingly, when students in this study were asked their perceptions of the ease or difficultly of the lesson they responded overall neutrally (mean=2.4 on the five point scale where one was "very easy" and five was "very difficult") irrespective of the treatment condition. This perception is clearly in contrast with the students' apparent experienced difficulty as evidenced by the posttest scores. Although the fact that all students were told that they had "passed" may have influenced their perceptions, they clearly failed to perceive lesson difficulty accurately. One resulting premise from this might be that the responsibility of instruction to keep students on-task in meaningful ways is increased when student perceptions about the amount of required mental effort are inaccurate.

In the Rieber (in press) study, students did not benefit significantly from traditional post-questioning as a practice technique. In the present study, this type of traditional practice, called Behavioral Practice, again did not produce an effect. However, activities in the Cognitive Practice group, which allowed students to participate in a structured simulation requiring them to manipulate the science concepts and principles, appeared to be effective. The Cognitive Practice activities were thought to promote deeper levels of mental processing (as defined by Craik & Lockhart, 1972). Students were forced to actively engage in the processes of the science material rather than merely studying the content. This is consistent with previous research which indicates that behaviorally-based activities are more effective for lower-level learning, whereas cognitively-based activities are more effective for higher-level learning (Clark, 1984). Partial differentiation between the effects of behaviorally-based versus cognitively-based practice activities on higher-level learning is supported by the results reported here. Both practice activities seemed to aid students in organizing the material as evidenced in the decreased response time in the Practice versus No Practice groups. Students in Practice groups were more familiar with using and applying the rules and were in a better position to readily select the appropriate rule for answering each posttest question than students in the No Practice group. This latter group was overtly required to apply the rules for the first time during the posttest.

Lastly, one contributing factor which helps explain why an effect was produced for Cognitive Practice and not Behavioral Practice (as compared to No Practice) was that Cognitive Practice was probably very intrinsically motivating for students of this age level, an important characteristic for maintaining interest and keeping students on-task longer (Malone, 1981). The students were encouraged to fantasize about being the pilot of a starship in outer space.

The interaction between Visual Elaboration and Practice was interesting. An interaction between these two factors was predicted. It was hypothesized that students would benefit from practice activities most when the lesson presentation support was minimal. Instead, students benefited most from the animated instruction when the practice support was moderate. In other words, the animated instruction provided more support for the relatively weak behavioral practice activity than for the cognitive practice activity. However, the benefits of the animated instruction were eliminated without practice. Students did not benefit from the behavioral practice unless it was used in tandem with the animated elaborations. Animated instruction coupled with traditional questioning facilitated results similar to those produced by the Cognitive Activities. It may have been that the occasional questioning encouraged students to attend more closely to the animated visual cues provided during the lesson. The animated elaborations presented without any practice support were no more beneficial than either static graphics or no graphics.

One interesting finding concerns the degree of incidental learning resulting from animated instruction. As previously indicated, lesson objective six tested the application of Newton's second law concerning the relationship between force, mass, and acceleration. This laws explains that when two objects of different masses are both acted on by the same size force, the initial acceleration experienced by the object with larger mass is less. This principle was never directly taught, but was implied solely in the animated instruction. One animated elaboration illustrated a large solid box moving very slowly across the computer screen after being kicked with the same force which had just previously animated a small ball moving quickly across the screen. No attempt was made to intentionally teach or explain why the box moved more slowly than the ball. Students receiving Animated Graphics scored higher on this objective at $p=.09$. Students seemed to be attending to the appropriate details of the animation which pertained to this principle although they were not prompted to do so.

The strong positive attitudes and lack of differentiation between the lesson conditions are not surprising. Any potential differences were probably overridden by novelty and Hawthorne effects. Students enjoyed the opportunity and the attention received which resulted from their participation and this seemed to carry over to their general attitudes about computers, science, and the lesson.

In summary, the results of this study indicate that animation can serve as an effective instructional aid. However, given the track record of animation research, the efficacy of animation is obviously very subtle and difficult to draw out — animation has yet to be proven as a potent instructional variable. Previous research has indicated that students do not always attend to the additional visual prompts provided by animation (Rieber, in press). Given proper conditions, animation can serve to influence student achievement. These conditions include using animation to teach lesson material which involves motion and trajectory, lesson material which is adequately challenging but not unreasonably so, and also using animation in tandem with other supportive instructional activities such as practice. Future research is needed to clarify the specific nature of the interaction of animated instruction and practice. More information and insight is needed to demonstrate other content areas where animated instruction could be expected to be congruent to the demands of the material.

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Table 1

Mean Percent Scores and Standard Deviations for the Posttest

Visual Elaboration		Practice: Behavioral	Practice: Cognitive	Practice: No Practice
Static Graphic	Mean	44.6	51.3	51.3
	SD	(30.5)	(33.2)	(33.1)
	n	15	12	13
Animated Graphic	Mean	66.0	61.6	47.2
	SD	(31.6)	(34.7)	(33.2)
	n	11	14	14
No Graphic	Mean	44.9	58.1	45.3
	SD	(32.6)	(34.1)	(30.4)
	n	12	14	14

Table 2

ANOVA Summary Table

Source	*DF*	*MS*	*F*	Probability
(V)isual Elaboration	2	5662.42	6.09	0.002*
(P)ractice	2	5423.62	5.83	0.003*
(V)(P)	4	3985.85	4.28	0.002*
Error	660	930.49		
(L)esson Objective	5	20338.72	21.86	0.0001*
(V)(L)	10	799.53	0.86	0.571
(P)(L)	10	1268.25	1.36	0.193
(V)(P)(L)	20	667.39	0.72	0.811
Error	660	930.49		

*$p<.01$

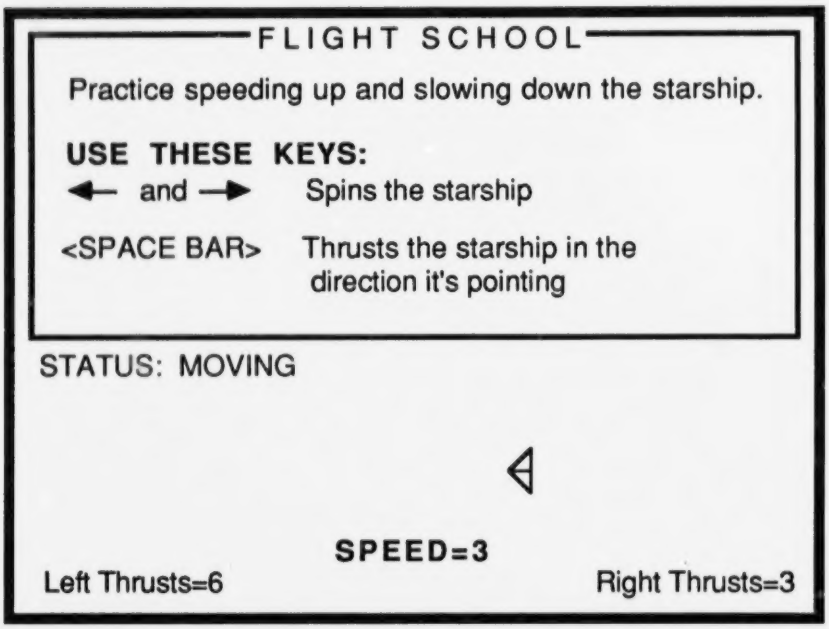

Figure 1. Snapshot of the computer screen during an episode of Cognitive Practice. (Animated starship is under student control. Arrow keys spin the starship in 180 degree increments resulting in one-dimensional motion.)

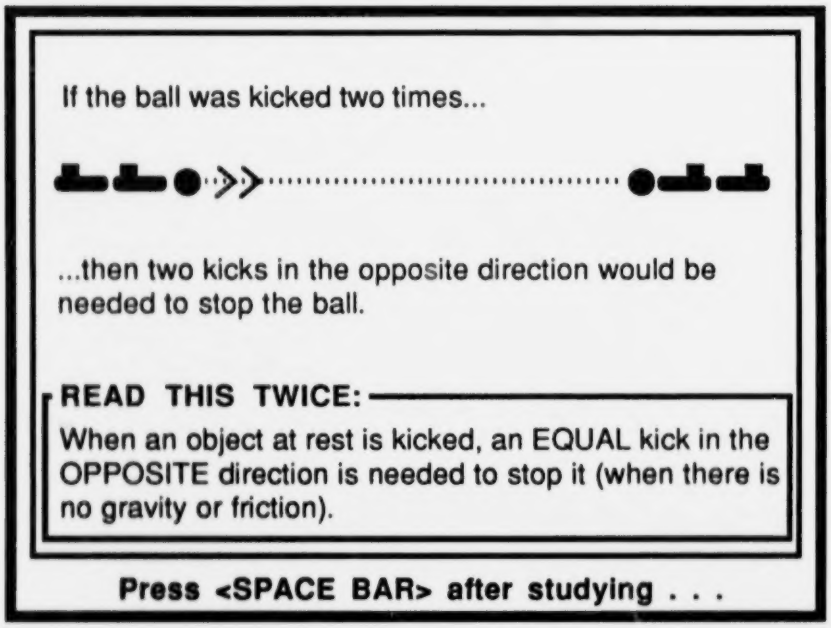
If the ball was kicked two times...
...then two kicks in the opposite direction would be needed to stop the ball.
READ THIS TWICE:
When an object at rest is kicked, an EQUAL kick in the OPPOSITE direction is needed to stop it (when there is no gravity or friction).
Press <SPACE BAR> after studying . . .

Figure 2. Example of a computer screen which includes a static visual elaboration.

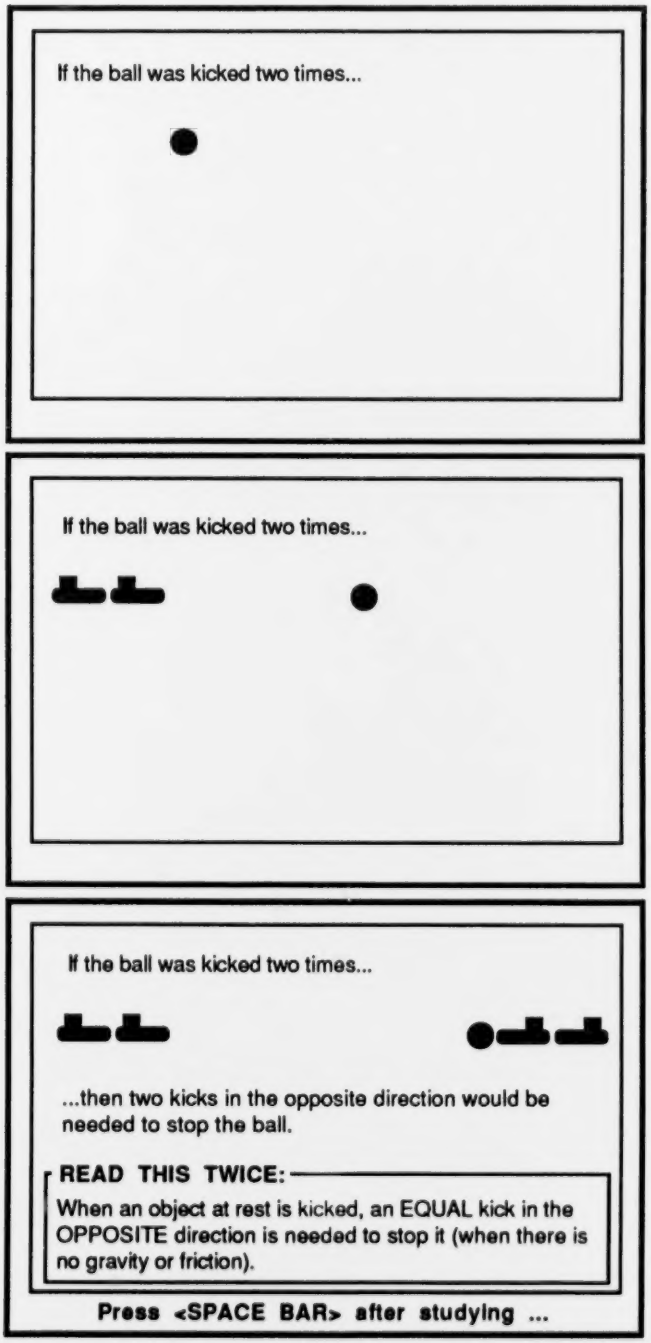
If the ball was kicked two times...
0 seconds
If the ball was kicked two times...
5 seconds
If the ball was kicked two times...
...then two kicks in the opposite direction would be needed to stop the ball.
12 seconds
READ THIS TWICE:
When an object at rest is kicked, an EQUAL kick in the OPPOSITE direction is needed to stop it (when there is no gravity or friction).
Press <SPACE BAR> after studying ...

Figure 3. Time-lapse sequence of an example computer screen which includes an animated visual elaboration.

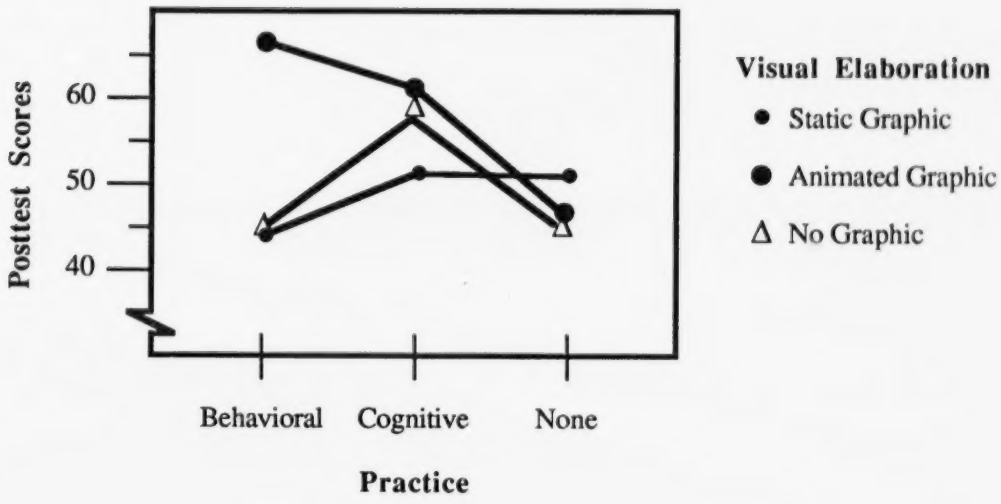

Figure 4. Interaction between Visual Elaboration and Practice.